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10/772,693	02/05/2004	Jun Ma	D/A3207IQ	5144

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EXAMINER

LEPISTO, RYAN A

ART UNIT

PAPER NUMBER

2883

DATE MAILED: 03/16/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

**Office Action Summary**

Application No.

10/772,693

Applicant(s)

MA ET AL.

Examiner

Ryan Lepisto

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --  
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 05 February 2004.  
2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.  
3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1-40 is/are pending in the application.  
4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.  
5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.  
6) ☒ Claim(s) 1-40 is/are rejected.  
7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.  
8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.  
10) ☒ The drawing(s) filed on 05 February 2004 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).  
11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).  
a) ☐ All b) ☐ Some \* c) ☐ None of:  
1. ☐ Certified copies of the priority documents have been received.  
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.  
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).  
\* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- 1) ☒ Notice of References Cited (PTO-892)  
2) ☐ Notice of Draftperson's Patent Drawing Review (PTO-948)  
3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)  
Paper No(s)/Mail Date 2/04.  
4) ☐ Interview Summary (PTO-413)  
Paper No(s)/Mail Date. \_\_\_\_\_.  
5) ☐ Notice of Informal Patent Application (PTO-152)  
6) ☐ Other: \_\_\_\_\_.

## DETAILED ACTION

### *Claim Rejections - 35 USC § 102*

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

1. **Claims 1 and 11** are rejected under 35 U.S.C. 102(b) as being anticipated by **Howell et al (US 6,734,597 B1)** (WO 01/99098 A2 with PCT publication date: 27 December 2001) (Howell). Howell teaches a thermal actuator (relevant embodiments shown in Fig. 1-2, 4-5 and 7) comprising a substrate having a surface (not shown, column 4 lines 9-12), first (12) and second (16) supports disposed in the surface of the substrate (column 4 lines 7-10), which implies device layer, or part of (implied surface) micro-electromechanical mechanism (column 4 lines 11-12) extending orthogonally from the substrate, a plurality (4 shown in Fig. 1-2, 3 shown in Fig. 3) of straight beams having segment neutral axis (20, 22) (2 beam width segments, one on each side of the coupling beam) made of polysilicon (column 5 lines 9-10) extending in parallel between the first (12) and second (16) supports forming a beam array with each beam having equal beam widths and neutral axes (Fig. 1) or that may vary (necked-down) in one embodiment in an implied predetermined pattern (column 5 lines 13-19) or the beam may have beam parallel width segments with neutral axes (3 shown in Fig. 4), where the beam with segments increase towards the center of the beam and decreases at the ends (column 10 lines 14-26), a coupling beam (24) extending orthogonally across the

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beams (20, 22) to couple them at their midpoint to create an "I" shaped actuator (column 4 lines 42-43). When the beams are "necked-down" as Howell teaches, the widths start thin near one side of the actuator at the supports (20, 22) and increase to the other side to the coupling beam (24) (column 5 lines 14-19). Howell also teaches heating the beams (20, 22) by a heat-generating device near the actuator (column 9 lines 35-37) like current source (37) (or by conduction or radiation, column 9 lines 38-39) that supplies electrical current via contact surfaces (38, 39) coupled to the beams (20, 22) causing the beams (20, 22) to buckle causing the coupling beam (24) to move in a predetermined direction (column 9 lines 16-26 and 26-39).

### ***Claim Rejections - 35 USC § 103***

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

2. **Claims 2-10 and 12-20** are rejected under 35 U.S.C. 103(a) as being unpatentable over the combination of Howell and **Maluf et al (US 2002/0174891 A1)** (Maluf).

Howell teaches the thermal actuator with the limitations described above used to reject claims 1 and 11 that also include limitations from applicant's individual dependent claims 4-6, 8-10, 14-16, 18-20, 24-27, 29-30, 34-37 and 39-40.

Howell does not teach expressly a heating layer on the surface of the substrate, exactly 5 beams segments or beams that having an offset axes and section to a side.

Howell does teach that heat may be generated by a device near the actuator (column 9 lines 32-37) and therefore, at the time of the invention, it would have been obvious to a person of ordinary skill in the art to place the heater at any place near the actuator including on the surface of device the supports are coupled to, in the case the substrate.

The motivation for doing so would have been to reduce energy consumption by having the heater on the substrate and thus reducing the number of separate components and allowing for adequate insulation so less thermal energy is needed (column 9 lines 39-44).

Howell does teach beams that are "necked-down" with the widths start thin near one side of the actuator at the supports (20, 22) and increase to the other side to the coupling beam (24) (column 5 lines 14-19).

Maluf teaches a thermal actuator (Fig. 3) with supports, a plurality of beams (48) and a central coupling member (44) wherein the embodiment shown in Fig. 3 the beams have one straight side (right side of each beam) and the widths of the beams increase to the midpoint and decrease from the midpoint to the supports forming offset segments from the main axis near the supports..

Howell and Maluf are analogous art because they are from the same field of endeavor, thermally actuated devices using parallel beams coupled to supports and a central coupling beam for beam buckling to create movement of the coupling beam.

At the time of the invention, it would have been obvious to a person of ordinary skill in the art to use the “necked-down” embodiment taught by both Howell and Maluf and combine it with the one-side straight and one side with offset regions beams as taught by Maluf in the actuator as taught by Howell creating since Howell teaches that increasing beam members (column 4 lines 49-51 and column 6 lines 42-45), displacement characteristics of the actuator (column 6 lines 12-14) and the geometry of the beams (column 10 lines 17-26) may be configured to fit particular design needs and that a “neck-down” beam would comprising many beam segments (any where from 2 to upwards towards 100 (including 5) depending on the kind of taper).

The motivation for doing so would have been to increase efficiency by lowering energy needs by creating higher resistance and thus greater thermal expansion upon actuation (Maluf paragraph 0063).

3. **Claims 21-31** are rejected under 35 U.S.C. 103(a) as being unpatentable over Howell and Maluf as applied to claims 2-10 and 12-20 above (an the limitations described above used to reject claims 1 and 11), and further in view of **Cochran (US 6,853,765 B1)**.

Howell and Maluf teach the thermal actuator with the limitation described above used to reject claims 2-10 and 12-20 (and the limitations described above with reference to Howell that also include limitations from applicant’s individual dependent claims 4-6, 8-10, 14-16, 18-20, 24-27, 29-30, 34-37 and 39-40).

Howell and Maluf do not teach expressly the thermal actuator being used in an optical switch.

Cochran teaches a thermal actuated optical switch (Fig. 2) comprising supports (18), parallel beams (20, 21) coupled to the supports and a central coupling beam (28) coupled to the beams (20, 21) at their midpoint that moves optical fibers (30, 32) for optical switching (column 2 lines 37 through column 3 lines 23).

Howell, Maluf and Cochran are analogous art because they are from the same field of endeavor, thermal actuated devices comprising supports, parallel beams coupled to the supports and a central coupling beam coupled to the beams at their midpoint that moves the coupling beam in response to a temperature change.

At the time of the invention, it would have been obvious to a person of ordinary skill in the art to employ the actuator as taught by Howell as a optical switch as is taught by Cochran since the structures are so similar.

The motivation for doing so would have been to increase functionality of the thermal actuator by using it to move two optical fibers in alignment on a chip surface (Cochran, column 2 lines 14-21).

### ***Double Patenting***

The nonstatutory double patenting rejection is based on a judicially created doctrine grounded in public policy (a policy reflected in the statute) so as to prevent the unjustified or improper timewise extension of the "right to exclude" granted by a patent and to prevent possible harassment by multiple assignees. See *In re Goodman*, 11 F.3d 1046, 29 USPQ2d 2010 (Fed. Cir. 1993); *In re Longi*, 759 F.2d 887, 225 USPQ 645 (Fed. Cir. 1985); *In re Van Ornum*, 686 F.2d 937, 214 USPQ 761 (CCPA 1982); *In re Vogel*, 422 F.2d 438, 164 USPQ 619 (CCPA 1970); and, *In re Thorington*, 418 F.2d 528, 163 USPQ 644 (CCPA 1969).

A timely filed terminal disclaimer in compliance with 37 CFR 1.321(c) may be used to overcome an actual or provisional rejection based on a nonstatutory double patenting ground provided the conflicting application or patent is shown to be commonly owned with this application. See 37 CFR 1.130(b).

Effective January 1, 1994, a registered attorney or agent of record may sign a terminal disclaimer. A terminal disclaimer signed by the assignee must fully comply with 37 CFR 3.73(b).

4. **Claims 1-40** are provisionally rejected under the judicially created doctrine of obviousness-type double patenting as being unpatentable over claims 1-70 of copending Application No. 10/634,941 and over claims 1-120 of copending Application No. 10/772,564. Although the conflicting claims are not identical, they are not patentably distinct from each other because both are drawn to the same thermal actuator and optical switch using the thermal actuator, both structurally and characteristically.

This is a provisional obviousness-type double patenting rejection because the conflicting claims have not in fact been patented.

### ***Conclusion***

1. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. All the following reference show the relevant state of the art at the time of the invention: Sinclair (US 2003/0121260 A1), Hill (US 6,137,206), Hill et al (US 6,218,762) (US 6,236,139 B1) (US 6,360,539 B1), Dhuler et al (US 5,955,817) (US 5,962,949) (US 5,994,816) (US 6,023,121) (US 6,114,794) (US 6,275,320 B1) (US 6,255,757 B1) (US 6,275,320 B1) (US 6,291,922 B1) (US 6,324,748 B1) (US 6,351,580 B1) (US 6,386,507 B2) (US 6,428,173 B1), Sinclair (US 6,422,011 B1) (US 6,804,959



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B2) (US 6,675,578 B1) (US 6,708,492 B2) (US 6,804,959 B2), Kubby et al (US 2003/0086641 A1) (US 2003/0210115 A1) (US 6,658,179 B2) (US 6,828,887 B2) (US 2004/0184709 A1) (US 2004/0184710 A1) (US 2004/0184720 A1) (US 2004/0184760 A1), Wood et al (US 5,909,078) (US 6,367,251 B1), Haake et al (US 5,870,518) (US 6,124,663), Duelli et al (US 6,388,359 B1), Mahadevan et al (US 6,262,512 B1) (US 6,333,583 B1, Missey et al (US 6,754,243 B2) (US 2003/0053231 A1), Lee et al (US 6,771,158 B2), Theil et al (US 6,747,773 B2), Quenzer et al (US 6,700,299 B2), Ko et al (US 2003/0132822 A1), Qiu et al (US 2003/0029705 A1), Ma et al (US 2002/0190603 A1) (US 6,753,582 B2), Chau et al (US 5,364,497), Saif et al (US 5,862,003), Rodgers et al (US 6,133,670), Hichwa et al (US 6,303,885 B1), Smith et al (US 6,308,631 B1).

### ***Contact Information***

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Ryan Lepisto whose telephone number is (571) 272-1946. The examiner can normally be reached on M-F 7:30AM-5:00PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Frank Font can be reached on (571) 272-2415. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

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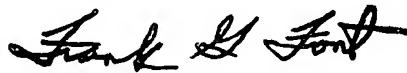
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Ryan Lepisto

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Date: 3/9/05



Frank Font

Supervisory Patent Examiner

Technology Center 2800